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A ROUTING PROTOCOL FOR ENHANCED EFFICIENCY IN WIRELESS SENSOR NETWORKS

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ABSTRACT

Wireless device Networks (WSNs) contain various device nodes having restricted power resource, that report perceived information to the bottom Station (BS) that needs high energy usage. Several routing protocols are projected during this regard achieving energy potency in heterogeneous eventualities. However, each protocol isn't appropriate for heterogeneous WSNs. potency of protocol degrades whereas ever-changing the no uniformity parameters. During this paper, we tend to initial take a look at Distributed Energy- economical cluster (DEEC), Developed DEEC (DDEEC), increased DEEC (EDEEC) and Threshold DEEC (TDEEC) beneath many completely different eventualities containing high level no uniformity to low level no uniformity. We tend to observe completely relating to the performance supported stability amount, network life time and turnout. EDEEC and TDEEC perform higher all told heterogeneous eventualities containing variable no uniformity in terms of life time, but TDEEC is better of all for the steadiness amount of the network. However, the performance of DEEC and DDEEC is very accomplished by ever-changing the no uniformity parameters of the network.

KEYWORDS: Cluster, Head, Residual, Energy, Heterogeneous & Routing Protocol

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Original Article

INTRODUCTION

In this paper, we have a tendency to study performance of heterogeneous WSN protocols beneath and multi level heterogeneous networks. We have a tendency to compare performance of DEEC, DDEEC, EDEEC and TDEEC for various situations of and construction heterogeneous WSNs. level heterogeneous networks contain traditional, advanced and super nodes whereas super nodes have highest energy state as compared to traditional and advanced Nodes. We have a tendency to discriminate every protocol on the premise of prolonging stability amount, network life time of nodes alive throughout grounds for varied level heterogeneous networks. Every containing totally different magnitude relation of traditional, advanced and super nodes alongside the construction heterogeneous WSNs [1]. It's found that completely different protocols have different potency for level and construction heterogeneous WSNs in terms of stability amount, nodes alive and network life time. DEEC and DDEEC perform well beneath three level heterogeneous WSNs containing high energy state distinction between traditional, advanced and super nodes in terms of stability amount [2]. However, it lacks in performance as compared to EDEEC and TDEEC in terms of network period of time. Whereas, EDEEC and TDEEC perform well beneath multi and levels heterogeneous WSNs containing low energy state distinction between traditional, advanced and super nodes in terms of each stability amount and network period of time. Energy consumption for aggregation of information is far less as compared to energy employed in data transmission. Low-Energy

accommodative agglomeration Hierarchy (LEACH) [3], Power economical Gathering in device data Systems (PEGASIS) [4], Hybrid Energy-Efficient Distributed agglomeration (HEED) [5] square measure algorithms designed for uniform WSN into account thus these protocols don't work with efficiency beneath heterogeneous situations as a result of these algorithms square measure unable to treat nodes otherwise in terms of their energy. Whereas, Stable Election Protocol (SEP) Distributed Energy-Efficient agglomeration (DEEC) Developed DEEC (DDEEC) increased DEEC (EDEEC) and Threshold DEEC (TDEEC) square measure algorithms designed for heterogeneous WSN. Gregorian calendar month is meant for two level heterogeneous networks, thus it can't work with efficiency in three or construction heterogeneous network. Gregorian calendar month considers solely traditional and advanced nodes wherever traditional nodes have low energy state and advanced nodes have high energy [5]. DEEC, DDEEC, EDEEC and TDEEC square measure designed for construction heterogeneous networks and may additionally perform with efficiency in two level heterogeneous situations.

Efficient routing in each wireless sensor network wants that the routing protocol ought to minimize energy dissipation (maximize energy conservation) and maximize net-work life time [6]. cluster-based energy-aware routing protocol that's one-hop protocol where a cluster head (which contain a extended vary radio) is assumed to relay the info on to the sink in an exceedingly very single hop; how-ever due to vary limitations and additionally the upper power node- to-sink direct broadcast; multiple hops through network might even be required in some smart things[7]. The cluster head might even be elite in an exceedingly} very irregular manner. like irregular selection of the cluster head, combined with rotating the cluster head position, can effectively avoid the primary drain of the energy of a particular node.

RELATED WORK

- **The operation of LEACH is split into rounds having 2 phases every specifically**
  - A set up section to arrange the network into clusters, CH advertising, and transmission schedule creation and
  - A steady-state section for data aggregation, compression, and transmission to the sink. LEACH is totally distributed and needs no international data of network. It reduces energy consumption by minimizing the communication value between sensors and their cluster heads [6].
  - Turning off non-head nodes.
- **The construct hierarchic cluster for energy economical communication between supply sensors and therefore the sink**
  - Historical question, to investigate past data values, One-time question, to require a photo read of the network.
  - Persistent queries, to observe an incident for amount of your time. Apteen guarantees lower energy dissipation and a bigger range of sensors alive [7].
  - It improves adolescent to beat its shortening and aims at each capturing periodic data assortment (leach) and reacting to time essential events.
  - Leach construct and teenage ideas permits the sensing element to send perceived data sporadically and react to any sharp changes within the worth of perceived attributes by news the corresponding values to their cluster head.
  - Historical question will simply be solving just once question to require a photo read of network.

- Persistent question to observe an incident for a amount of your time.
- Guarantees lower energy dissipation massive no of sensing element alive data centrically, hierarchical, data aggregation [8].

- **Multi Objective Energy Aware Sensor Information Systems**
  - Proposed homogenous cluster rule for wireless sensor network that saves power and prolongs network life.
  - The generation of the network is inflated by guaranteeing a homogenous distribution of nodes within the clusters. A brand new cluster head is chosen on the premise of the residual energy of existing cluster heads, holdback worth, and nearest hop distance of the node [9].
  - The homogenous rule makes certain that each node is either a cluster head or a member of 1 of the clusters within the wireless sensor network.

- **Sleep Scheduling In Wireless Sensor Network**
  - Time Division Multiple Access it's Assign to A sensing element with Consecutive time slots to scale back the frequency of state transition[10]
  - It divides time into slots that portion the tin that may activate the radio throughout the appointed time slots.
  - It needs abundant slots than needed in order that will facilitate in increasing the delay and scale back
  - The channel utilization TDMA wont to minimize the no of your time slots appointed whereas manufacturing AN interference free link planning Techniques [11].
    - Come out mechanism
    - Contiguous link planning
  - Scale back energy price and time overhead in state transition every nodes broadcast a message to advertise the energy state and location to its neighbor [12].

OBJECTIVES

- We compare performance of DEEC, DDEEC, EDEEC and TDEEC for various eventualities of 3 and construction heterogeneous WSNs.
- We discriminate every protocol on the idea of prolonging stability amount, network life time of nodes alive throughout round for various three level heterogeneous networks.
- To find the result on the basis of Three aspects :- a) Better service b) Immediate response c) Inconsistency

IMPLEMENTATION

In this section, we simulate totally different clump protocols in heterogeneous WSN mistreatment MATLAB and for simulations we have a tendency to use a hundred nodes haphazardly placed during a field of dimension 100m×100m. For simplicity, we have a tendency to take into account all nodes area unit either fastened or micro-mobile as supposed in [13] and ignore energy loss thanks to signal collision and interference between signals of various nodes that area unit

thanks to dynamic random channel conditions. During this situation, we have a tendency to area unit considering that, BS is placed at center of the network field. We have a tendency to simulate DEEC, DDEEC, EDEEC and TDEEC for three-level and multi-level heterogeneous WSNs. eventualities describe values for range.

Table 1: Value of Parameters

Parameters	Values
Network field	100 m,100 m
Number of nodes	100
Eo(initial energy of normal nodes)	0.5J
Message size	4000 bits
E_{elec}	50nJ/bit
E_{fs}	10nJ/bit/m2
E_{amp}	0.0013pJ/bit/m4
EDA	5nJ/bit/signal
d_o(threshold distance)	70m
P_{opt}	0.1

Of nodes dead in 1st, tenth and last rounds moreover as values for the packets sent to BS by CH at totally different values of parameters m, mo, a and b. These values area unit examined for DEEC, DDEEC, EDEEC and TDEEC. In heterogeneous WSN, we have a tendency to use radio parameters mentioned in Table one for various protocols deployed in WSN and estimate the performance for three level heterogeneous WSNs. Parameter m refers to fraction of advanced nodes containing additional quantity of energy a in network whereas, mo could be a issue that refers to fraction of super nodes containing additional quantity of energy b within the network [14].

RESULTS

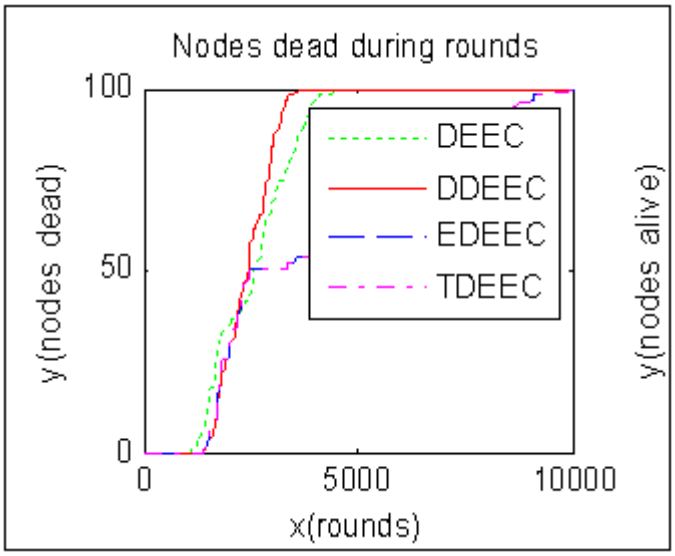

Figure 1: We Examine that First Node for DEEC, DDEEC, EDEEC and TDEEC

For the case of a network containing m = zero.5 fraction Packets sent to the SB of advanced nodes having a = one.5 times additional energy and mo=0.4 fraction of super nodes containing b = three times additional energy than traditional nodes [15]. From Figure 1 and 2, we have a tendency to examine that initial node for DEEC, DDEEC, EDEEC and TDEEC dies at 1117, 1470, 1583 and 1719 rounds severally. Tenth node dies at 1909, 1863, 1726 and 1297 rounds severally. All nodes area unit dead at 5588, 6180, 9873 and 9873 rounds severally. It's obvious from the results of all

protocols that in terms of stability amount, TDEEC performs better of all, EDEEC performs higher than DEEC and DDEEC however has less performance than TDEEC. DDEEC solely performs well as compared to DEEC and DEEC has least performance than all the protocols. Stability amount of DEEC and DDEEC is below EDEEC and TDEEC as a result of the possibilities in TDEEC and EDEEC area unit outlined severally for traditional, advanced and super nodes whereas, DEEC and DDEEC don't use totally different chances for traditional, advanced and super nodes therefore their performance is below EDEEC and TDEEC. However, instability amount of EDEEC and TDEEC is way larger than DEEC and DDEEC. The quantity of nodes alive in TDEEC is sort of larger than EDEEC as a result of in TDEEC the formula of threshold utilized by nodes for CH election is changed by together with residual and average energy of that spherical. Therefore nodes having high energy can become CHs[16]. Similarly, by examining results of packets sent to the SB by DEEC, DDEEC, EDEEC and TDEEC have their values at 125316, 139314, 391946 and 470248. Currently we have a tendency to see that packets sent to SB for DEEC and DDEEC is nearly same whereas, the packets sent to SB for EDEEC and TDEEC area unit virtually a similar as a result of the chance equations for traditional, advanced and super nodes is same in each of them. Currently returning to the CHs, the packets sent to CHs increase throughout the beginning of the network and bit by bit decrease down towards the tip owing to the nodes dying at the same time [17].

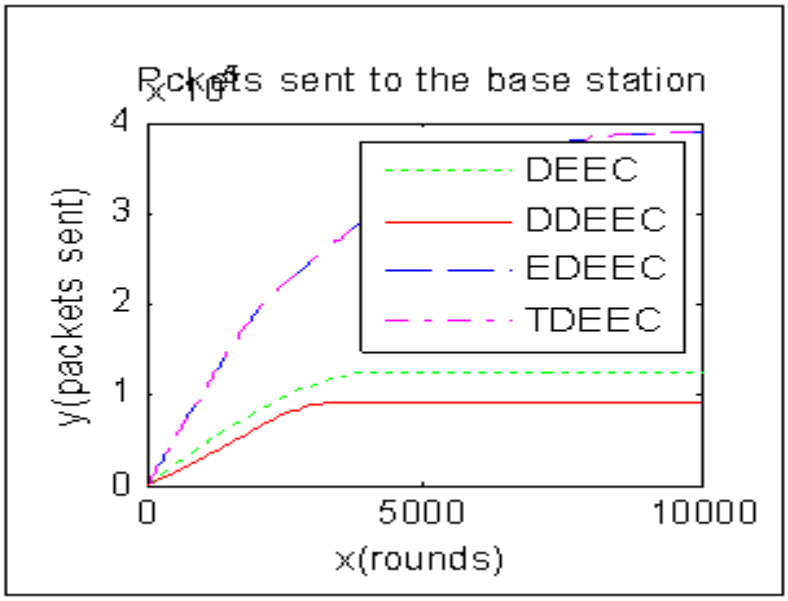

Figure 2: Shows that Packets Sent to BS by DEEC, DDEEC, EDEEC and TDEEC are 135650, 107891, 300735 and 365628 Respectively

Now considering second case during which the parameters amendment to a = one.3, b = 2.5, m = 0.4 and mo = zero.3. Figure three shows that initial node for DEEC, DDEEC, EDEEC and TDEEC dies of every protocol at 1291, 1355, 1367 and 1694 rounds severally. Tenth node dies at 1531, 1547, 1574 and 1946 rounds severally. All nodes area unit dead at 4870, 4779, 7291, 7291 rounds. Graph for variety of nodes [18].

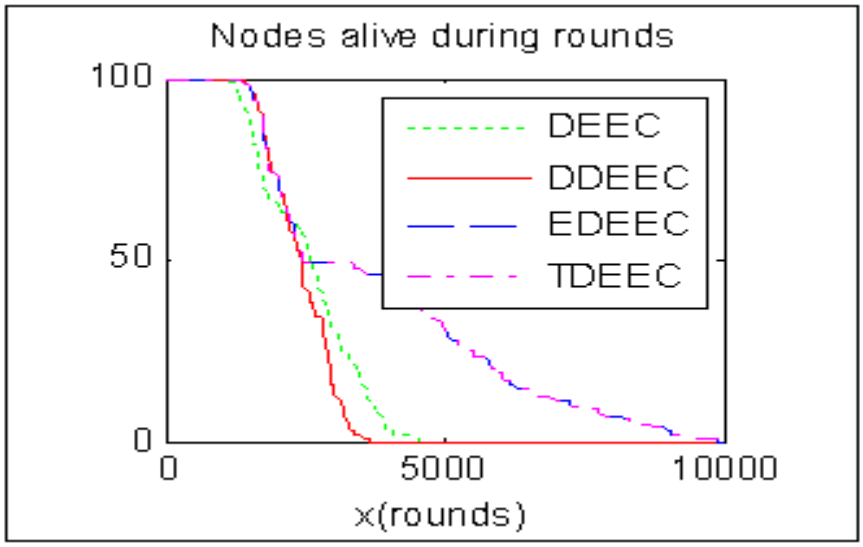

Figure 3: DEEC, DDEEC, EDEEC and TDEEC First Node Dies at 1576, 1495, 1382 and 1863 Round Respectively

Alive in initial, tenth and every one rounds is strictly the flip to the graph for variety of nodes dead. results of Figure four shows that packets sent to bachelor's degree by DEEC, DDEEC, EDEEC and TDEEC area unit 135650, 107891, 300735 and 365628 severally. As we tend to see that by decreasing the values of parameters, TDEEC still performs best among the four protocols. EDEEC performs higher than TDEEC. DDEEC performs higher than TDEEC and EDEEC whereas, DEEC performs worst [19].

Now considering third case, parameter values any decrease to a = one.2, b = 2, m = 0.3, mo = 0.2 during which initial node for DEEC, DDEEC, EDEEC and TDEEC dies at 963, 1158, 1309, and 1753 rounds severally. Tenth node dies at 1290, 1573, 1556 and 2026 rounds severally. All nodes area unit dead at 6533, 4386, 7467 and 7467 rounds severally. Similarly, the packets to bachelor's degree sent in DEEC, DDEEC, EDEEC and TDEEC area unit 132378, 91269, 259370 and 339406 severally as shown in Figure 4. Currently considering fourth case, parameters area unit hyperbolic to a = one.6, b = 3.2, m = 0.6, mo = 0.5. Results show that for DEEC, DDEEC, EDEEC and TDEEC initial node dies at 1576, 1495, 1382 and 1863 spherical severally. Tenth node dies at 2245, 2213, 1691 and 2574 spherical severally

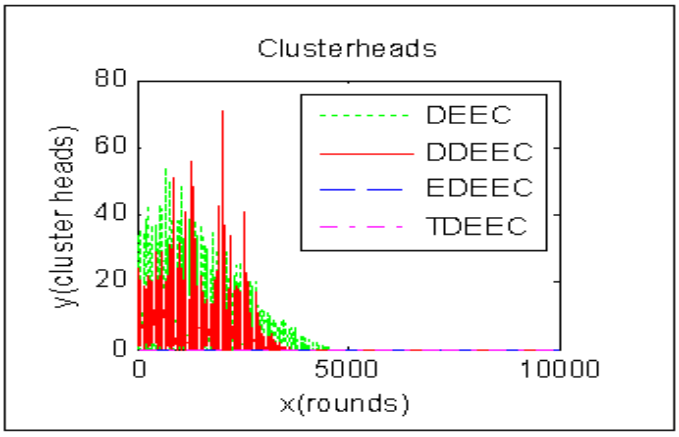

Figure 4: We First Test Distributed Energy- Efficient Clustering (DEEC), Developed DEEC (DDEEC), Enhanced DEEC (EDEEC) and Threshold DEEC (TDEEC) Under Several Different Scenarios Containing High Level Heterogeneity to Low Level Heterogeneity

Clustering may be tired two varieties of networks i.e consistent and heterogeneous networks. Nodes having same energy state are referred to as consistent network and nodes having completely different energy levels referred to as heterogeneous network. Now in last case considering structure heterogeneous network we tend to see that for DEEC, DDEEC, EDEEC and TDEEC initial node dies at 1196,1262,1349,1688 rounds severally. Tenth node dies at 1389, 1511, 1593, 2045 rounds severally and every one nodes are dead at 5547, 3999, 6734, 6734 rounds. it's ascertained from all the higher than situations that for initial case of 3 level heterogeneous WSN, considering a = one.5, b = 3, m = 0.5 and mo = zero.4 TDEEC performs better of all, EDEEC performs higher than DDEEC and DEEC wherever DDEEC performs higher than DEEC in terms of stability amount. For EDEEC and TDEEC instability amount is higher as compared to DDEEC and DEEC. once values of a, b, m, mo are cut linearly more in second and third situation, same results as in initial situation are found for all protocols [20]. In fourth and fifth situations once a, b, m, mo are raised linearly it's found once larger variety of simulations that in some situations DEEC performs higher than DDEEC, EDEEC in terms of stability amount, TDEEC performs best and stability amount of DDEEC and EDEEC is nearly a similar. Whereas instability amount of TDEEC and EDEEC is additionally larger than DEEC and DDEEC even some nodes aren't dead in EDEEC and TDEEC once ten,000 rounds. In last are considering structure heterogeneous network within which all nodes have random energy it's ascertained that TDEEC performs better of all, EDEEC performs higher than DDEEC and DEEC and DDEEC performs higher than DEEC in terms of stability amount. For EDEEC and TDEEC instability amount is higher as compared to DDEEC.

CONCLUSIONS

We have examined DEEC, E-DEEC, T-DEEC and DDEEC for heterogeneous WSNs containing completely different level of non uniformity. Simulations prove that DEEC and DDEEC perform well within the networks containing high energy distinction between traditional, advanced and super nodes. Whereas, we discover out that EDEEC and TDEEC perform well altogether situations. TDEEC has best performance in terms of stability amount and life time however instability amount of EDEEC and TDEEC is incredibly giant. So, EDEEC and TDEEC are improved in terms of stability amount whereas compromising on period of time. More analysis may be done on the higher than mentioned issue.

FUTURE WORK

- Our proposed protocol Performance analysis and compared results performs well compared to Low Energy Adaptive Clustering Hierarchy.
- To evaluate the performance of through put the number of packet received by BS are compared with the number of packet send by the nodes in each round.
- To analyze the energy consumption of nodes in each round. Residual energy ensures graceful degradation of network life.

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